

**II. CLAIMS 1-36 MEET THE CRITERIA FOR INDUSTRIAL APPLICABILITY UNDER PCT ARTICLE 33(4)**

Applicant acknowledges that claims 1-36 meet the criteria for Industrial Applicability set forth in PCT Article 33(4).

**III. CLAIMS 1-30 MEET THE CRITERIA FOR NOVELTY UNDER PCT ARTICLE 33(2)**

**A. Written Opinion Citations and Explanations**

In Item V, the Written Opinion asserts that claims 1-30 lack the requisite novelty under PCT Article 33(2), being anticipated by Ehrenwald et al. (U.S. Patent No. 4,467,172) ("Ehrenwald"). The Applicant respectfully disagrees and offers the following remarks to facilitate examination of this application.

**B. Independent Claim 1 Meets the Novelty Criteria**

Independent Claim 1 of the subject application is generally directed to using a focused ion beam to brand gemstone diamonds. More specifically, a focused ion beam is manipulated to impact a surface of the gemstone diamond at a specified location for a specified time period, resulting in graphitized portions of the gemstone diamond in the shape of a predetermined design.

In contrast to the subject application, the Ehrenwald patent is directed to the very different concept of marking a diamond with a laser. See, e.g., col. 2, line 26. See also, col. 1, lines 67-68; col. 3 line 39 - col. 4, line 20; Fig. 1. The position of a movable table with a fixture holding the diamond is controlled by a computer such that the diamond is positioned beneath a laser beam having a fixed position. See, e.g., col. 4, lines 64-68; col. 5, lines 13- 25 ("fixed focussed beam"); Fig. 1.

Considering claim 1, the Ehrenwald patent does not disclose or suggest "directing a focused ion beam at the gemstone diamond to be branded". In contrast, the cited patent is specifically directed to a laser marking system in which the position of the laser is fixed. Any reference to a focused beam 22 is a reference to a focused laser beam, not a focused ion beam. See, e.g., col. 2, line 42; col. 5, lines 5 and 25.

Additionally, the Ehrenwald patent does not disclose or even suggest "manipulating the beam such that the beam impacts the surface of the gemstone diamond at a number of specified locations for a specified amount of time" as claimed. In contrast, Ehrenwald discloses controlling the position of a table. The cited reference does not manipulate a focused ion beam.

Based on the forgoing, the Applicant respectfully submits that claim 1 meets the novelty criteria under PCT Article 33(2) and is not anticipated by U.S. Patent No. 4,467,172 of Ehrenwald et al.

C. Dependent Claims 2-10 Meet the Novelty Criteria

Dependent claims 2-10 incorporate all of the language of independent claim 1 and thus meet the Novelty criteria under PCT Article 33(2). Further, dependent claims 2-10 recite additional novel elements and limitations, and thus the Ehrenwald patent does not disclose or suggest the subject matter of these dependent claims.

D. Independent Claim 11 Meets the Novelty Criteria

Independent Claim 11 of the subject application is generally directed to using a coordinate transfer system to generate mapping data. This data represents distances between the location at which a gemstone diamond which will be branded and certain predetermined reference points on the holder. Based on the mapping data, a focused ion beam is manipulated to impact the gemstone diamond for a desired length of time to brand the design onto the gemstone diamond.

First, as explained earlier with respect to claim 1, Ehrenwald does not disclose or suggest the use of a focused ion beam to brand a gemstone diamond. Second, the cited

patent does not disclose or suggest manipulating a focused ion beam for any purpose.

Additionally, the cited patent does not disclose or suggest "using the coordinate transfer system to create mapping data which represents the distances between the location on a gemstone diamond which will be branded and certain set reference points on the holder". The cited patent makes no reference to mapping data generated in this way. Rather, the Ehrenwald patent provides that a positioning table is moved in two directions under control by a computer. See, e.g., col. 5, lines 9-14 ("holding fixture 56 is mounted to a positioning table 60 having respective slide members 62, 64, each adapted for selective independent translatory displacement in perpendicular directions in a horizontal plane").

Finally, construing the claim as a whole, the Ehrenwald patent does not disclose or suggest "using the mapping data to manipulate a focused ion beam machine..." The cited patent does not disclose mapping data (as previously indicated), a focused ion beam, or manipulation of a focused ion beam, much less manipulating a focused ion beam machine based on mapping data.

E. Dependent Claims 12-30 Meet the Novelty Criteria

Dependent claims 12-30 incorporate all of the language of independent claim 1 and meet the Novelty criteria under PCT Article 33(2). Further, dependent claims 12-30 recite additional novel elements and limitations. Thus, the Ehrenwald patent does not disclose or suggest the subject matter of these dependent claims.

F. Claims 31-36 and 11 Meet the Novelty Criteria

Although not identified as lacking the requisite novelty under PCT Article 33(2), Applicant also notes that claims 31-36 meet the criteria for Novelty for the same reasons cited above.

**IV. CLAIMS 31-36 MEET THE CRITERIA FOR INVENTIVE STEP  
UNDER PCT ARTICLE 33(3)**

A. Written Opinion Citations and Explanations

In Item V, the Written Opinion asserts that claims 31-36 lack the requisite inventive step under PCT Article 33(3) as being obvious over Jones et al. (UK 203 096) ("Jones") in view of Wittekoek et al. (4,334,139) ("Wittekoek"). The Applicant respectfully disagrees with the Written Opinion.

B. Independent Claim 31 Meets the Inventive Step Criteria

Independent Claim 31 of the subject application is generally directed to an apparatus for branding a gemstone diamond with a focused ion beam utilizing a coordinate transfer system and one or more computer programs which generate mapping data. The focused ion beam is manipulated based on the mapping data. As a result, the focused ion beam impacts the gemstone diamond at one or more desired locations for a predetermined length of time to brand a predetermined design onto the gemstone diamond.

The Jones patent is directed to a system for inscribing workpieces, such as masks, for use in the manufacture of microcircuits and the direct manufacture of microcircuits and devices on substrates and wafers. See, e.g., p. 1, col. 1, lines 6-11. The Jones patent explains that the workpiece / table is positioned between first and second beams. The beams that are used to mark or inscribe masks or wafers may comprise light beams, electron beams, and ion beams. See, e.g., p. 1, col. 2, lines 67-68. The second beam under the table or workpiece reads registration marks. Based on the registration mark information, the table and/or the first beam is moved to align the system such that the beam impacts the workpiece at the desired location. See, e.g., p. 1, col. 1, lines 22-25;

p. 48-59.

The Jones patent, however, is not at all related to the subject matter of the Applicant's invention. The cited patent does not relate or refer to the branding of gemstone diamonds or any other similar objects. Rather, the Jones patent is related to the electronics manufacturing (marking masks, wafers, and substrates). Applicant has amended the claims to refer to "gemstone" diamonds to further distinguish the unrelated fields of use and applications of the Applicant's invention compared to the subject matter of the Jones patent.

Further, the Jones patent does not disclose the use of a focused ion beam to inscribe a design onto a gemstone diamond. Rather, the Jones patent discloses beams such as light beams, electron beams and ion beams generally for the purpose of inscribing a mask or wafer. The beams disclosed in Jones are for very different applications and applied to materials with very different chemical and physical properties. Considering the nature and power of electron, light, and ion beams that are used to inscribe masks and wafers as described in Jones, the disclosed beams are not used to brand a diamond with a design.

The Jones patent refers to focused beams, but only in the context of finely focused electron beams, which are used to fabricate semiconductor devices directly onto a silicon wafer

and the like. See, e.g., pg. 3, col. 1, lines 23-37.

However, a diamond is not physically inscribed or branded by a finely focused electron beam as used in Jones.

Additionally, the cited patent does not disclose or suggest an aspect of claim 31 directed to

"one or more computer programs, performed by the computer attached to the coordinate transfer system, for generating mapping data which represents the distances between the location on the gemstone diamond which will be branded and certain set reference points on the holder".

The cited patent is not related to gemstone diamonds, much less mapping data based on a location on the gemstone diamond which will be branded and certain set reference points on the holder. Rather, the "mapping" data in Jones merely refers to the location of registration marks, and aligning a table based on the registration marks. See, e.g., p.1, col. 1, lines 22-25, 60-63.

Moreover, the Jones patent certainly does not disclose or suggest a focused ion beam that is manipulated as claimed:

"one or more computer programs, performed by the computer for using the mapping data to manipulate the focused ion beam machine such that it produces a focused ion beam which impacts the gemstone diamond at one or more desired locations for a predetermined length of time to brand the design onto the gemstone diamond".

Rather, the cited patent merely provides a sensor and control circuit system to move the table between the beams to correct

the position of the beam 20 and the position of the table 10 based on the registration marks. See, e.g., pg. 2, col. 1, lines 7-18. While the Jones patent may disclose controlling a beam position relative to the table, the cited patent does not disclose or suggest manipulating a focused ion beam based on mapping data as claimed.

The Wittekoek patent does not cure the deficiencies of the Jones patent. The cited patent generally describes writing patterns in a layer on a substrate using an electron beam or an ion beam. Col. 1, lines 7-13, 25-28. Specifically, this patent is directed to a system for continuously monitoring the height of the beam using series of lenses, prisms, and control mechanisms. See, e.g., Figs 1 and 4; col. 2, lines 31-38; and col. 4, lines 17-30.

However, the Wittekoek patent, like the Jones patent, is not at all related to the subject matter of the Applicant's invention. The Wittekoek patent does not relate or refer to the branding of gemstone diamonds or any other similar objects. Rather, the cited patent is related to the electronics manufacturing (etching away resist layers or writing microcircuit patterns into a semiconductor layer), similar to the Jones patent. See, e.g., col. 1 lines 10-43. Applicant's amendment of "gemstone" diamonds further distinguishes the unrelated fields of use of the Applicant's invention and the

subject matter of the Wittekoek patent.

Further, the Wittekoek patent does not disclose the use of a focused ion beam used to physically inscribe a design onto a gemstone diamond. Rather, the Wittekoek patent discloses the use of an electron beam or an ion beam for similar electronics or semiconductor manufacturing purposes as described in the Jones patent. See, e.g., col 1, lines 28, 34-37. The Wittekoek patent refers to focused beams, but only in the context of focused electron or ion beams used to fabricate semiconductor devices. See, e.g., col. 1, lines 10-11, 15-30. Thus, the process disclosed in Wittekoek is not used to brand a gemstone diamond. The beams disclosed in Wittekoek are used in very different applications and applied to materials with very different chemical and physical properties, not to inscribe gemstone diamonds.

Additionally, the cited patent does not disclose or suggest an aspect of claim 31 directed to

"one or more computer programs, performed by the computer attached to the coordinate transfer system, for generating mapping data which represents the distances between the location on the gemstone diamond which will be branded and certain set reference points on the holder".

Like the Jones patent, the Wittekoek patent is not related to gemstone diamonds, much less mapping data based on a location on the gemstone diamond which will be branded and certain set reference points on the holder.

Moreover, the Wittekoek patent certainly does not disclose or suggest a focused ion beam that is manipulated as claimed:

"one or more computer programs, performed by the computer for using the mapping data to manipulate the focused ion beam machine such that it produces a focused ion beam which impacts the gemstone diamond at one or more desired locations for a predetermined length of time to brand the design onto the gemstone diamond".

Rather, the cited patent refers to moving the beam and the substrate relative to each other in directions transverse to the beam axis. See, col. 1, lines 11-13. While the Wittekoek patent may disclose moving a beam position relative to a substrate, the cited patent does not disclose or suggest manipulating a focused ion beam based on mapping data as claimed.

Thus, the combination of the Jones and Wittekoek patents would not result in the invention of claim 31.

Correspondingly, the Applicant respectfully submits that independent claim 31 meets the Inventive Step Criteria of PCT Article 33(3).

C. Dependent Claims 32-36 Meet the Inventive Step Criteria

Dependent claims 32-36 incorporate all of the language of independent claim 31. Further, dependent claims 32-36 recite additional novel elements and limitations. Thus, dependent claims 32-36 meet the Inventive Step criteria under PCT Article 33(3).

D. Claims 1-30 Meet the Inventive Step Criteria

Although not cited as lacking the requisite Inventive Step under PCT Article 33(3), Applicant notes that the Ehrenwald, Jones, and Wittekoek patents, individually or in any combination, would not result in the inventions of claims 1-30 for the same reasons stated above. Neither the Jones patent nor the Wittekoek patent cures the deficiencies of the Ehrenwald patent. None of the patents disclose or suggest a focused ion beam used to brand gemstone diamonds. Moreover, no patent discloses or suggests mapping data or manipulating the focused ion beam based on that mapping data as claimed. Further, there is no motivation to combine these references considering the different fields of use, applications, and materials that are marked in the cited patents.

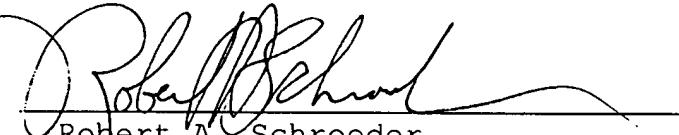
Thus, claims 1-30 meet the criteria for Inventive Step.

**VI. Conclusion**

In view of the foregoing, Applicants respectfully submit that all of the claims meet the Novelty and Inventive Step criteria of PCT Articles 33(2) and 33(3).

Respectfully submitted,

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